



## RESEARCH ARTICLE

## PRESENT STATUS AND PROBLEMS OF UNDERUTILIZED VEGETABLES AS PERCEIVED BY THE RETAILERS AND CONSUMERS OF KHULNA CITY OF BANGLADESH

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## ABSTRACT

Though underutilized vegetables are safe, cheap and rich sources of proteins, fibers, minerals, vitamins, and antioxidants; they attract very little attention from the researchers and from the vegetables' traders. The study was conducted to evaluate the status of underutilized vegetables at retailers' and consumers' level of Khulna city along with the problems faced by the retailers and preferences of the consumers related to underutilized vegetables. More than half (60%) of the retailers were middle aged and only 12.5% were young. Three-fourths (75%) of the retailers were female though only 2.5% had received higher secondary level of education. Only one-fourth of the retailers participated in different organizations though all showed low involvement with those activities. However, majority of the retailers (82.5%) showed favorable attitude towards underutilized vegetables. Among the consumers, about a half of them (47.5%) belonged to middle age, 42.5% had postgraduate degree, and only 12.5% were involved with different organizations. However, just more than one-third (35%) consumers bought underutilized vegetables regularly. Consumers preferred underutilized vegetables mainly because of health and nutritional benefits. Laborious collection of underutilized vegetables, not getting permission from the owner, and collecting vegetables all day long without having meal ranked 1st, 2nd and 3rd, respectively in terms of problems being faced by the retailers.

## KEYWORDS

Underutilized vegetables, Health benefits, Medicinal properties, Retailer, Consumer, Preferences, Problems

## 1. INTRODUCTION

Underutilized vegetables (UUVs) are undervalued or neglected vegetables with a little or limited use; they are neither grown commercially on large scale nor traded widely (Jena et al., 2018). The term 'underutilized' generally refers to the species whose potentiality has not fully been realized. They are also known as orphan, abandoned, lost, local, minor, traditional, alternative or forgotten vegetables. They often come either from short-lived herbaceous plants (whole) or and from woody plants (leaves and flowers) (Pan and Bhatt, 2018).

Underutilized vegetables are not under-nutrition rather than they are under-exploited, under-recognized and under-appreciated. They are cheap, affordable and nutritious; rich in vitamin, mineral, folate, health-promoting factors and have been used for centuries or more for their food, fiber, fodder, oil, medicinal or antioxidant properties. However, their importance have been reduced over time (Hossain and Hasan, 2018). They can ensure food security, income generation and environmental services of both the rural and urban dwellers particularly the poor people (Hossain and Hasan, 2018; Nnamani et al., 2009; Sinha and Khare, 2018).

Among the 600 species of vegetables worldwide, three-fourths are underutilized (Pandey et al., 2014). Important underutilized vegetables in Bangladesh are water lily, sour grass, swamp cabbage, leaf amaranth, ivy gourd, Indian pennywort, giant taro, Bengal arum, pigweed, water hyssop. In Bangladesh, the average per capita daily vegetable intake is 112g per day (<http://fpmu.gov.bd/agridrupal/content/guide-postharvest-handling->

[fruits-and-vegetables](http://fpmu.gov.bd/agridrupal/content/guide-postharvest-handling-)), whereas the recommended intake is 220 g/day (FAO, 2015). Underutilized vegetables minimize the malnutrition and maximize the financial returns.

Underutilized vegetables can be a key component of balanced diet for the poor people worldwide and may play a major role in achieving global nutritional security through providing nutrients, vitamins and minerals. They have immense potential for contribution to our vegetables production, as they are well adapted to our existing as well as adverse environmental condition and generally resistant to pests and diseases. They also add genetic diversity in the existing pool of vegetables. Moreover, underutilized vegetables are short-duration crop with low risk that fit well in existing cropping system and require minimum input. Underutilized vegetables are sturdy, can grow naturally or with minimum care even under adverse soil and climatic conditions, and adapted to low-input agriculture (Rai et al., 2005). They play a major role in diversification of diet leading to more balanced source of micronutrients and provides more options to build temporal and spatial heterogeneity in cropping pattern (Ebert et al., 2014). These vegetables are capable to fulfill the nutritional requirement with a least cost. In this context, underutilized vegetables can play a major role to fulfill the nutritional requirement. A few underutilized vegetables like giant taro, taro, elephant foot yam, drumstick, swamp cabbage are cultivated in Bangladesh. However, most of our farmers are not interested to cultivate these types of vegetables.

Bangladesh is a densely populated (more than 170 million people are living in an area of 147,570 km<sup>2</sup>) developing country. According to UNDP

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(United Nations Development Program, 2012) about 48% of the total population is leading their lives below poverty line, and about 52% are landless. The national economy largely depends on agriculture. However, agricultural land is decreasing @ 1% in every year due to rapid urbanization and population pressure. The underutilized vegetables can ensure food security of the poor people and have potential role towards sustainable development goals (SDGs) of Bangladesh as they can grow anywhere without care and some of them grow as weed.

Though the underutilized vegetables have good nutritional and medicinal values along with the potentiality of ensuring food security of the poor people in a country like Bangladesh, they are cultivated in a limited scale. The possible reasons of low cultivation of underutilized vegetables are lack of availability of planting material, lack of awareness on nutritional and medicinal properties and lack of information on production technique (Jena et al., 2018). There is little information on its cultivation and availability in Khulna, the 3<sup>rd</sup> largest city of Bangladesh. We also do not have any idea about the consumers' perception on underutilized vegetables. Different stakeholders level involved in underutilized vegetables are retailers, consumers and farmers. Retailers collect these vegetables from dawn to dusk and sell them in the market next day. Consumers consume these types of vegetables who are very much health conscious. Therefore, retailers and consumers involved in underutilized vegetables are interviewed through a structured interview schedule aiming the following objectives.

- i. To explore the status of underutilized vegetables along with preference of consumers towards them.
- ii. To analyze the selected socioeconomic characteristics of the retailers' and consumers' of underutilized vegetables.
- iii. To identify the problems of trading underutilized vegetables.

## 2. METHODOLOGY

### 2.1 Research Design

In this study 'diagnostic and descriptive research' design has been followed. Diagnostics or analytic design is concerned with specifying and interpreting relationship of the variables. A descriptive research design, on the other hand, is used for finding the facts with adequate interpretation.

### 2.2 Locale of The Study

Two important vegetable market places namely (i) Boyra Bazar and (ii) Daulatpur Bazar of Khulna city were surveyed for interviewing the retailers and consumers. Those areas were selected due to higher availability of different types of underutilized vegetables.

### 2.3 Population and Sampling Technique

All the retailers and consumers, who were involved in collecting, marketing and purchasing underutilized vegetables, were considered as the population of the study. Boyra Bazar and Daulatpur Bazar were selected purposively for accessing retailers and consumers. Thus, the sampling method could be termed as "purposive sampling" technique. In this case, researchers were unbiased for selecting the interviewee following random sampling procedure.

**Table 1:** Distribution of The Sample Respondents (Retailers and Consumers).

Serial	Name of The Markets	Number of Retailers Interviewed	Number of Consumers Interviewed
1.	Boyra Bazar	26	22
2.	Daulatpur Bazar	14	18
	Total	40	40

### 2.4 Preparation of Interview Schedule

An interview schedule was prepared for data collection. The interview schedule contained both simple and direct form of questions (close type and open type). The interview schedule was prepared in English and pre-tested before collecting data. After pre-testing, correction and rearrangements were made in the interview schedule.

### 2.5 Data Collection

Data were collected using face-to-face interviews by the researchers

themselves using the interview schedule. To get valid and relevant information the researchers made all possible efforts to explain the purpose of study to the respondents. While starting the interview with any respondents, the researchers' took all possible care to establish rapport with them so that the respondents would not feel any hesitation to furnish proper answers. Besides, the views of some key informants were taken to enrich and validate some information collected through interview. Data were collected from the respondents during August 23 to October 4, 2019.

### 2.6 Selection and Measurement of The Study Variables

There were three focus issues in this study: (i) present status of underutilized vegetables, (ii) socioeconomic characteristics of the retailers and consumers, and (iii) problems faced in trading underutilized vegetables.

Present status was assessed and described in the Results and Discussion against five aspects such as place of collection (3.1), availability of underutilized vegetables (3.2), income [BDT day<sup>-1</sup>] from underutilized vegetables' trading (3.3), expenses incurred [BDT day<sup>-1</sup>] in purchasing underutilized vegetables (3.4), and choice preference reasons (3.5).

Data were also collected on the socioeconomic characteristics of the retailers and consumers. The selected socioeconomic characteristics were: (a) age [years], (b) gender [categories], (c) educational qualifications [schooling years], (d) organizational participation [scores], (e) knowledge [scores], and (f) attitude [scores]. Calculation and measurement of selected characteristics were carried out following standard procedures (Sheel et al., 2019; Islam et al., 2021).

Knowledge of the retailers about underutilized vegetables was calculated based on their knowledge answer verifying with five questions (each having 2 marks for correct answer, 1 mark for partial answer and 0 for wrong answer).

Problem severity score was computed for each respondent (retailers) from his/her response to the asked question. The researchers have chosen wide varieties of problems faced (total 11 problems) by the retailers as an attempt to not exclude any problem deliberately. Each respondent was asked to identify the problems intensity that he/she has faced along with the extent of the problem against each of the statements. The extent of the problem was measured using 5-point rating scale as 'severe', 'acute', 'moderate', 'less severe' and 'not at all', and the rating scale was assigned scores as 4, 3, 2, 1, and 0, respectively. The severity of an individual problem was determined based on problem severity index (PSI) as described below.

$$PSI = N_1 \times 4 + N_2 \times 3 + N_3 \times 2 + N_4 \times 1 + N_5 \times 0$$

Where,

$N_1$  = Number of respondents extended the problems and related as severe

$N_2$  = Number of respondents extended the problems and rated as acute

$N_3$  = Number of respondents extended the problems and rated as moderate

$N_4$  = Number of respondents extended the problems and rated as less

$N_5$  = Number of respondents did not extent the problems at all

After determination of PSI, the severity of the problem was determined by following formula:

$$(\%) \text{ Severity of the problem} = \frac{\text{observed problem score}}{\text{possible highest problem score}} \times 100$$

The rank order of the problems was determined based on the severity (%) of the problem. The problem which obtained the highest percentage of severity, got the first rank and then the second rank and so on.

### 2.7 Data Processing and Analysis

After collection of data, all the information contained in the interview schedules was edited. Data were transferred to coding sheet with numerical scores given to each question. Data analysis was done by using SPSS and MS Excel. Non parametric measuring scales such as nominal and ordinal scales were used for transferring data for different levels of measurement. Simple statistics like frequency counts, percentage, range, mean and standard deviations were used in the interpretation of descriptive data. A five points Likert type of scale was used to measure the attitude of respondents towards underutilized vegetables.

### 3. RESULTS AND DISCUSSION

#### 3.1 Present Status of Underutilized Vegetable

Present status of underutilized vegetables was assessed based on place of collection, availability, income, expenses and preferences.

##### 3.1.1 Place of Collection

The retailers collect UUVs from five different sources (Table 2). The dominant collection place is 'others farm but not cultivated (35)' followed by 'non-cultivated area (14)', pond-side (6), bought from others (4) and the lowest-preferred place is own cultivated farm (3). As the UUVs grow naturally in the farm, in fallow land, pond-side, roadside or any neglected places without care, the retailers can collect them from more than one sources that results cumulative place of collection more than 40. Rural people collect various species of edible weeds (vegetables) from their agricultural and non-agricultural fields as well as from forestlands to supplement their staple food (Pan et al., 2018).

Sources	Number	%
Own Cultivated Farm	3	7.5
Others Farm but Not Cultivated	35	87.5
Non-Cultivated Area	14	35
Pond Side	6	15
Bought from Others	4	10

##### 3.1.2 Availability of Underutilized Vegetables at Khulna City of Bangladesh

Availability of UUVs varies from season to season (Table 3). There are three cropping seasons in Bangladesh, they are *Kharif-I* (16 march – 30 June), *Kharif-II* (1 July – 15 October), and *Rabi* (16 October – 15 March).

Seasons	Number	%
<i>Rabi</i>	15	37.5
<i>Kharif-I</i>	17	42.5
<i>Kharif-II</i>	22	55
Year round	25	62.5

**Table 4:** List of Available Vegetables at Local Market of Khulna During Study Period.

Sl. No.	English Name	Local Name	Botanical Name
1.	Swamp Cabbage	দেশিকলমি	<i>Ipomoea Aquatica</i>
2.	Sour Grass	আমরুলশাক	<i>Oxalis Corniculata</i>
3.	Green Amaranth	শাঁকনটে	<i>Amaranthusviridis</i>
4.	Ivy Gourd	তেলাকুচা	<i>Cocciniagrandis</i>
5.	Indian Pennywort	খানকুনি	<i>Centellaasiatica</i>
6.	Giant Taro	মানকচু	<i>Alocasiamacrophylla</i>
7.	Alligator Weed	মালঞ্চ	<i>Ludwigiarepens</i>
8.	Elephant Foot Yam	ওলকচু	<i>Amorphophalluscampulatus</i>
9.	Pipli	পেপলিশাক	<i>Piper Longum</i>
10.	Fig	ডুমুর	<i>Ficushispida</i>
11.	Water Hyssop	ব্রাহ্মীশাক	<i>Bacopamonniari</i>
12.	Roselle	চুরুর	<i>Hibiscus Sabdariffa</i>
13.	Pigweed	বধুয়াশাক	<i>Chenopodium Album</i>
14.	Sesbania	বকফুল	<i>Sesbaniagrandiflora</i>
15.	Bengal Arum	ঘেটকচু/ বিষকচু/ ঘাটিকোলা	<i>Typhoniumtrilobatum</i>
16.	Water Lily	শাপলা	<i>Nymphaeanouchali</i>
17.	Banana Flower	কলারমোচা	<i>Musa Spp.</i>
18.	Marsh Herb	হেলেক্ষা	<i>Enhydrafluctuans</i>

A maximum of 25 UUVs are available throughout the year followed by 22 in the *Kharif-II*, 17 in *Kharif-I*, and 15 in *Rabi*. During the study period, 18 UUVs have been identified at the local market of Khulna (Table 4) and some UUVs can be available in more than one season in a year. In fact, availability of UUVs varies from locality to locality and season to season (Pan et al., 2018).

##### 3.1.3 Income

The average income of retailers from UUVs is BDT 336 with a minimum of 50 and maximum of 650 (Table 5). Average income of a day laborer in our country is BDT 500 day<sup>-1</sup>. However, female day laborers are less paid than males. Moreover, they are not frequently hired for tough jobs. Therefore, a female can engage herself in collecting and retailing UUVs when other jobs are not available. Moreover, female laborers do not have to spend all day for this job. After finishing the retailing, they can perform their household works, which is usually not possible while serving as a day laborer. In addition, collected UUVs also support them as their own food.

**Table 5:** Income of Retailers Through Selling Underutilized Vegetables.

	N	Minimum	Maximum	Mean	Std. Deviation
Income (BDTday <sup>-1</sup> )	40	50.00	650.00	336.25	136.15

##### 3.1.4 Expenses

The consumers pay, on an average, 21 BDTday<sup>-1</sup> to buy UUVs with a minimum of 10 and maximum of 40 (Table 6) indicating that a minimum cost is involved in buying underutilized vegetables and thus to fulfill nutritional requirement with least cost as these vegetables are highly nutritious and cheap. A family of Khulna city, on an average, consume 73 g vegetables that include potato, brinjal, sweet gourd, ash gourd, bottle gourd, yard long bean, bitter gourd, pepper, and leafy vegetables in a week (Shahiduzzaman et al., 2009).

**Table 6:** Expenses of Consumers for Buying Underutilized Vegetables

	N	Minimum	Maximum	Mean	Std. Deviation
Expenses (BDTday <sup>-1</sup> )	33	10.00	40.00	21.03	7.96

##### 3.1.5 Consumer Preference Towards Underutilized Vegetables

Consumers prefer underutilized vegetables, as they are nutritious, tasty with medicinal properties, and can fulfill nutritional requirement with least cost. The causes of preferences has been listed and ranked here (Table 7).

**Table 7:** Causes of Consumers' Preference Towards Underutilized Vegetables.

Serial No.	Causes	Number	%	Rank
01.	Tasty	11	27.5%	4 <sup>th</sup>
02.	Health Benefits	19	47.5%	1 <sup>st</sup>
03.	Contains Vitamin and Minerals	12	30%	3 <sup>rd</sup>
04.	Fulfilling Nutritional Requirement with Least Cost	10	25%	5 <sup>th</sup>
05.	High Medicinal Properties	13	32.5%	2 <sup>nd</sup>
06.	No Fertilizer Used	8	20%	7 <sup>th</sup>
07.	Can Be Used for Multipurpose	9	22.5%	6 <sup>th</sup>

The most preferable reason of choosing UUVs by the consumers is health benefits. Underutilized vegetables have huge health benefits as they contain essential nutrients which are often lacking in staple crops (Kumar and Rajasree, 2018). They are rich in antioxidants that can provide necessary protection against many chronic and infectious diseases (Pan and Bhatt, 2018). Moreover, UUVs are safe and free of hazards.

The second ranked benefit of underutilized vegetables as described by the consumers is having high medicinal properties. Medicinal components are isolated from UUVs and is used in pharmaceutical industries for synthesis of cancer drugs (Kumar and Rajasree, 2018). Underutilized vegetables are thought to prevent many diseases like diabetes, gastric ulcer, indigestion, constipation and coronary disease.

Third benefit is underutilized vegetables contain vital vitamins and minerals. UUVs contains equal or even higher quantity of vitamins and minerals compared to cabbage or tomato. In fact, underutilized vegetables play a major role in obtaining nutritional security, as they are rich sources of vitamin, mineral, micronutrients, protein and other phytonutrients (Keatinge et al., 2011).

Fourth ranked benefit is these vegetables are tasty. Some consumers like their taste. These are tasty because they are natural and require no synthetic fertilizers and pesticides and therefore free from residues of hazardous chemicals.

Fifth positioned benefit of preference of underutilized vegetables by the consumers is they are capable to fulfill the nutritional requirement of consumers with minimum cost. Consumers can buy UUVs with a minimum price compared to major vegetables; such as the average price (BDT/kg<sup>-1</sup>) of eggplant and tomato are 70 and 60, respectively where as UUVs costs only BDT 5-10 to buy a bundle of swamp cabbage or marsh herb. They are the cheapest vegetables in the market. Sixth ranked benefit is underutilized vegetables have multipurpose use; such as, Indian pennywort can be eaten as paste, *pakora*, or as *chop* besides its fresh consumption. Similarly, *sesbania* and water hyssop can be taken as *pakora* or as fried. In fact, the majority of underutilized crops are multipurpose in nature (Williams, 2002). The seventh ranked benefit of UUVs is no fertilizer used in these vegetables. The UUVs grow in nature and are free from all chemical fertilizers. Therefore, they are fresh, attractive, safe, and tasty.

### 3.2 Socio Economic Characteristics of Retailers

The socioeconomic characteristics of the retailers and consumers include (a) age, (b) gender, (c) educational qualifications, (d) organizational participation, (e) knowledge, and (f) attitude.

Retailer is a person who sells goods to the public in relatively small quantities for use and consumption rather than for resale. Retailer collects these underutilized vegetables from roadside, pond side, wetland and fallow land for all day long; next day they sell it to the market. Selected characteristics of retailers are presented in the Table 8.

The age of the retailers ranged from 20 to 70 years, with a mean 48.58 (Table 8). Middle-aged people are more engaged with the collection and

retailing of underutilized vegetables as they are strong enough. However, old people of 70 years were also engaged with the job indicating necessity of social security.

Among the retailers, 75% were female and the rest (25%) were male that shows strong evidence of women participation in retailers' level. Because the women find it as an easy way to earn money and they do not need capital, or technical expertise for collecting and retailing UUVs. Rural women can do the job besides their routine household works. The average year of schooling of the retailers is 2.39 with a minimum 0 and maximum 12 (Table). A maximum of 37.5% retailers can sign only whereas 25% of them were illiterate and therefore, they choose this task to earn their livelihood.

Among the retailers, 75% did not involve in any organization and those who involved in organization (25%), their participation was low indicating retailers' low involvement with organization. About two-thirds (62.5%) of the respondents had medium knowledge regarding underutilized vegetables compared to 32.5% respondents had high knowledge and 5% respondents had low knowledge. As retailers collect and sell UUVs to market for long time, they gain some knowledge about them with the time being. However, their knowledge is confined to familiar vegetables rather than all types of underutilized vegetables. It is remarkable that knowledge of retailers about underutilized vegetables was above satisfaction. Some retailers have low knowledge but in minimum level because of unwillingness of gathering knowledge about that particular vegetables as they only focus to earn. The observed score of attitude towards underutilized vegetables of the retailers ranged from 15 to 25 with a mean 21.35 and standard deviation of 2.39. Most of the retailers (82.5%) had favorable attitude towards underutilized vegetables compared to one-tenth (10.0%) having moderately favorable attitude. Only 7.5% retailers having highly favorable attitude and no one had less favorable attitude. Therefore, it is assumed that all of the retailers of the study area had positive attitude for underutilized vegetables.

Some retailers showed negative attitude towards underutilized vegetables because of difficulty in collection and low market price. The possible reasons for the low utilization of underutilized vegetables, in spite of their recognized importance, are lack of availability of planting material, lack of awareness on nutritional and medicinal importance and lack of information on production technique (Jena et al., 2018).

**Table 8: Socioeconomic Characteristics of The Retailers of Underutilized Vegetables.**

Characteristics	Categories	Score	N=40		Mean	Standard Deviation	Range	
			Number	%			Minimum	Maximum
Age (years)	Young	≤35	5	12.5	48.58	11.06	20	70
	Middle	36-55	24	60.0				
	Old	>55	11	27.5				
Gender	Male		10	25				
	Female		30	75				
Educational Qualifications	Illiterate	0	10	25.0	2.39	3.03	0.00	10.0
	Can Sign Only	0.5	15	37.5				
	Primary	1-5	8	20.0				
	Secondary	6-10	6	15.0				
	Higher Secondary	11-12	1	2.5				
	Undergraduate	13-16	0	0				
Organizational Involvement	Yes		10	25.0				
	No		30	75.0				
Organizational Participation	Low	≤6	10	100.0	1.50	0.71	1.00	3.00
	Medium	7-12	0	0				
	High	>12	0	0				
Knowledge	Low	≤3	2	5.0	4.40	2.62	0.00	9.00
	Medium	4-6	25	62.5				
	High	>6	13	32.5				
Attitude	Less Favorable	6-12	0	0	21.35	2.39	15.00	25.00
	Moderately Favorable	13-18	4	10.0				
	Favorable	19-24	33	82.5				
	Highly Favorable	25-30	3	7.5				

### 3.3 Socioeconomic Characteristics of the consumers

The average age of the consumers was 39.45 years with a minimum 25 and a maximum 64 (Table 9). A total of 90% consumers come from middle (47.5%) and young (42.5%) age groups indicating health consciousness of these groups of people. They know the health benefits of underutilized vegetables, which is a great. However, old aged consumers are not so much willing to buy these types of vegetables probably due to the lack of health consciousness. In case of gender, female (52.5%) and male (47.5%) are almost equally interested to buy UUVs indicating that both the groups are aware of health benefits of them.

The consumers' educational qualification varies from secondary (25%) to post graduate (42.5%) levels. Only 5% consumers have undergraduate and 27.5% have higher secondary level of education. In another study on flower business at Khulna city, 21.9% businessperson had higher secondary level of education (Kabir et al., 2015). Most of the consumers were from postgraduate category suggesting that they are highly health conscious, as they are well-educated compared to illiterate person. It is noteworthy that consumers having no education (illiterate), or who can

sign only or having only primary level of education did not buy UUVs indicating that these groups of people are not aware of health benefits of underutilized vegetables.

The majority (87.5%) of the consumers did not have any organizational involvement and those who (12.5%) involved with organization, their level of participation is low indicating that the consumers are not so much interested in organizations. Among the consumers, about half of them (47.5%) buy UUVs occasionally, 35% consumers buy regularly, and the rest 17.5% consumers do not buy these vegetables at all. This data represents that most of the consumers spend money for these vegetables only occasionally.

Underutilized vegetables can play a major role to fulfill the nutritional requirement. They are rich in vitamin, mineral and other health promoting factors including high antioxidant. They play a major role in diversification of diet leading to more balanced source of micronutrients. Underutilized vegetables contain phytochemicals that have anti-cancer and anti-inflammatory properties, which confer many health benefits.

**Table 9: Socioeconomic Characteristics of Consumers of Underutilized Vegetables.**

Characteristics	Categories	Score	N=40		Mean	Standard Deviation	Range	
			Number	%			Minimum	Maximum
Age (Years)	Young	≤35	17	42.5	39.45	10.57	25	64
	Middle	36-55	19	47.5				
	Old	>55	4	10.0				
Gender	Male		19	47.5				
	Female		21	52.5				
Educational Qualifications	Illiterate	0	0	0	13.60	3.29	8.00	17.00
	Can Sign Only	0.5	0	0				
	Primary	1-5	0	0				
	Secondary	6-10	10	25.0				
	Higher Secondary	11-12	11	27.5				
	Undergraduate	13-16	2	5.0				
	Postgraduate	>16	17	42.5				
Organizational Involvement	Yes		5	12.5				
	No		35	87.5				
Organizational Participation	Low	≤6	5	100.0	1.2	0.45	1.00	2.00
	Medium	7-12	0	0				
	High	>12	0	0				
Attitude	Regularly		14	35.0				
	Occasionally		19	47.5				
	Not at All		7	17.5				

### 3.4 Problems Faced by the Retailers

According to retailers, 11 problems have been identified while collecting and retailing UUVs. They ranked 'collection of vegetables is laborious' as top (1) problem. The retailers collect UUVs dawn to dusk and they, in most of the cases, do not even have their meal. Therefore, this is the toughest

task they do for their livelihood. The second ranked problem is 'not getting permission from the farm owner' and it happens occasionally especially when they go for collecting vegetables from the side of a fish farm. They get restricted by the farm owner, which is a real issue. Third problem indicates that they had to collect these vegetables without having their meal all day long.

**Table 10: Rank Order of The Faced-Problems by The Retailers Regarding Underutilized Vegetables.**

Serial	Problems	Number	%	Rank
1.	Collecting Vegetables All Day Without Having Any Food	11	27.55%	3 <sup>rd</sup>
2.	Unable to Sell All Vegetables	9	22.5%	5 <sup>th</sup>
3.	Collection of Vegetables is Laborious	22	55%	1 <sup>st</sup>
4.	Not Getting Permission from Farm Owner	12	30%	2 <sup>nd</sup>
5.	Attack of Snakes and Insects	10	25%	4 <sup>th</sup>
6.	Lack of Proper Market Price	2	5%	10 <sup>th</sup>
7.	No Equity Between Market Value and Hard Labor	8	20%	6 <sup>th</sup>
8.	Have to Spend All Day In Marshy Land	5	12.5%	8 <sup>th</sup>
9.	Cannot Get Proper Place for Selling	3	7.5%	9 <sup>th</sup>
10.	Transportation Cost	1	2.5%	11 <sup>th</sup>
11.	Have to Collect Vegetables From Many Places	7	17.5%	7 <sup>th</sup>

Sometimes, the retailers are attacked by snakes and insects (rank 4) as they had to collect UUVs from the muddy, wet, and marshy land. Fifth ranked problem is retailers are unable to sell all the vegetables in the market as the consumers buy these vegetables occasionally. Therefore sometimes these vegetables remain unsold. Sixth ranked problem highlighted that they do not get proper price of their vegetables. However, they work hard to collect and retailing UUVs, which indicates inequity between market value and hard labor. Moreover, the distance between collection places create problem to travel. Seventh problem is they have to collect vegetables from more than one places, as they cannot get desired types and amount of vegetables from a single place. To add more variation, they had to visit more than one place. Eighth ranked problem is to become sick and get cold as they spend all day in marshy and wet land for collection of vegetables. The ninth and tenth problems are 'they cannot get proper place for selling' and 'lack of proper market place'. Low and unstable price of onion in local market of Khulna also reported as a problem of onion bulb production (Khan et al., 2003). The last problem is transportation cost. Sometimes their collection place is very distant from their market place. Therefore, they have to pay more for transportation.

#### 4. CONCLUSIONS

We identified 18 underutilized vegetables, which are mostly collected from others farm and more than 50% of them are year round. The consumers preferred underutilized vegetables for their health benefits, medicinal properties and vitamin and mineral content. More than half of the stakeholders (retailers and consumers) were middle aged, 15% of them, on an average, had higher secondary level of education and about one-fifth (18%) was connected with different organizations. According to retailers, the major problems of retailing underutilized vegetables are laborious collection of underutilized vegetables, not getting permission from the owner, and collecting vegetables all day long without having meal. Among the retailers, women (75%) were more involved in collecting and marketing of underutilized vegetables as this is an independent, easy job requiring no monetary or technical assistance.

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#### DISCLOSURE STATEMENT

The authors report there are no competing interests to declare.

#### DATA AVAILABILITY STATEMENT

All the data are included in the manuscript.

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